

Please cancel, without prejudice, claims 1-44.

Please add the following claims 45-56:

45. A method of identifying environmental parameters of interest by identifying the presence and abundance of a nucleic acid marker sequence comprising the steps of:

a. providing a soil sample containing a population of interest;

b. isolating genomic DNA from the soil sample;

c. performing a diagnostic PCR-based assay utilizing a plurality of species-specific probes to the nucleic acid marker sequence that shows a correlation to the parameter of interest; and

d. inferring the presence of the parameter of interest based upon the presence of the nucleic acid marker sequence.

46. A method of identifying environmental parameters of interest by identifying the presence and abundance of a nucleic acid marker sequence comprising the steps of:

- a. providing a soil sample containing a population of interest;
- b. isolating genomic DNA from the soil sample;
- c. performing a hybridization-based assay utilizing a species-specific probe to the nucleic acid marker sequence that shows a correlation to the parameter of interest; and
- d. inferring the presence of the parameter of interest based upon the presence of the nucleic acid marker sequence.

47. A method according to claim 1 or claim 2, wherein the nucleic acid marker shows a perfect correlation to the parameter of interest.

48. A method according to claim 1 or claim 2, wherein the nucleic acid marker shows a high degree of correlation to the parameter of interest.

49. A method according to claim 1 or claim 2, wherein the nucleic acid marker shows a moderate degree of correlation to the parameter of interest.

50. A method according to claim 1 or claim 2, wherein the environmental parameter of interest is a subsurface oil or natural gas deposit.

51. A method according to claim 1 or claim 2, wherein the environmental parameter of interest is a dynamic change that occurs during an oil and gas deposit's development that affect its hydrocarbon composition, migration, depletion, and hydrogen sulfide production.

52. A method according to claim 1 or claim 2, wherein the environmental parameter of interest is a mineral deposit.

53. A method according to claim 1 or claim 2, wherein the environmental parameter of interest is an indicator of the mineral deposit's composition.

54. A method according to claim 1 or claim 2, wherein the environmental parameter of interest is an agricultural pest.

55. A method according to claim 1 or claim 2, wherein the environmental parameter of interest is an industrial organic chemical.

56. A method according to claim 1 or claim 2, wherein the environmental parameter of interest is water.